the specific validity of the forms respectively so called, as the positions of both need much further investigation.

Nor should I even like to say positively that *P. africanus* is specifically distinct from the large South-Italian Weasels, of which many more specimens will be needed before we can say whether or no they grade into the Maltese representative of the group. Indeed the only points that I can claim to have made out with any certainty are (1) that *P. africanus* is a genuine African animal, found in Egypt, and (2) that a practically identical form occurs in Malta.

4. On the Visceral Anatomy and Brain of *Dendrolagus bennetti*. By Frank E. Beddard, M.A., F.R.S., Prosector to the Society.

[Received January 14, 1895.]

So far as I am aware the only published account of the visceral anatomy of this genus is a paper by the late Sir Richard Owen [1], which, moreover, deals with a different species. It seemed to me therefore to be worth while to put on record such additional facts as I have been able to observe concerning the structure of this aberrant genus.

Before proceeding to describe the anatomy of the viscera, there are two external characters to which I should like to call attention.

The first of these relates to the colour of the fur: the shorter and deeper-lying hairs in many parts of the body are of a pink colour, like that which colours the throat of *Macropus rubens*. This pink hue does not appear until the fur is ruffled and the deeper hair brought into view.

As to the second point, I must first refer to a paper by the late Prof. Garrod [2] upon *Dorcopsis luctuosa*. In that paper he described "four large and conspicuous glandular hair-follicles in the middle line, arranged to form a square," lying in the skin between the jaws. These are figured [3]. I observed nothing in *Dendrolagus* of so obvious an appearance as the structures figured by Garrod; but, when the skin was removed, two small black hair-follicles were easily visible lying side by side. From the apex of each of these proceeds a hair, which is not any longer than the other hairs upon the throat. I examined a specimen of *Petrogale penicillata*, and found that it exactly resembled *Dendrolagus bennetti* in this respect. Whether these structures represent in a rudimentary form the large and complicated sternal glands of *Myrmecobius* [4] and *Didelphys dimidiata* [5] I am unable to say.

[1] "Notes on the Anatomy of the Tree-Kangaroo (*Dendrolagus inustus*, Gould)," P. Z. S. 1852, p. 103.

[2] "On the Kangaroo called *Halmaturus luctuosus* by d'Albertis, and its Affinities," P. Z. S. 1875, p. 48.

[3] *Loc. cit.* pl. viii.

[4] "Note on a Point in the Structure of *Myrmecobius*," P. Z. S. 1887, p. 527.

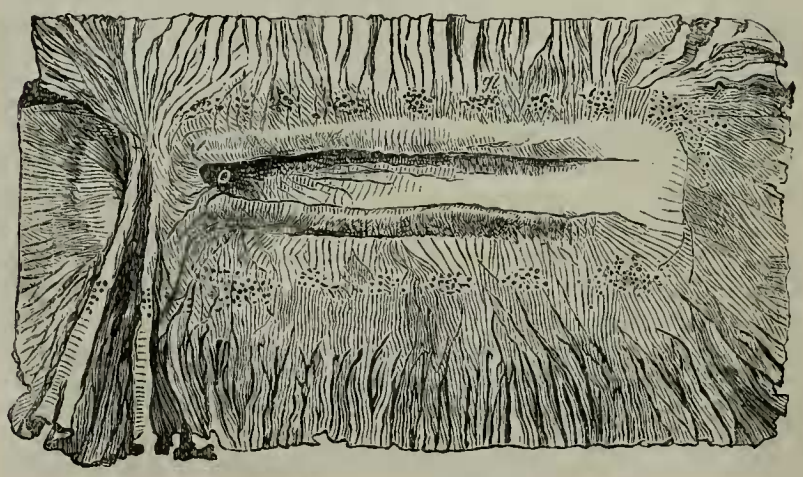
[5] "Note on the Sternal Gland of *Didelphys dimidiata*," P. Z. S. 1888, p. 353

When the animal was opened by a longitudinal incision through the abdominal walls a little to the left of the middle line, considerable traces of the ventral mesentery were apparent. From the bladder a fold of membrane arose, which was in parts at least an inch deep: this fold passed along the ventral body-wall about halfway to the ribs, and gradually died away. Close to the ribs it was resuscitated for the space of about an inch; but this section of the ventral mesentery was not continuous with the posterior section or with the falciform ligament in front. In all mammals (that I have examined) the bladder is attached to the parietes by a fold of membrane, which is, doubtless, so far the equivalent of the primitive ventral mesentery. But in no mammal, except *Ornithorhynchus* [1], have I noticed this fold to extend so far forward as in the Marsupial which forms the subject of the present paper. I could not, however, discover the least trace of any blood-vessels in any part of it. It was completely anangious.

§ *The Stomach and Intestines.*

The *stomach* in general appearance is very like that of the Kangaroo, but the cardiac *cul-de-sac* is not bifurcate, and the present species agrees in this with *D. inustus*, with *Dorcopsis*, and with *Petrogale*. In structure the stomach of the present species appears hardly to differ from that of *D. inustus*; but I am able to give a somewhat fuller account than that given by Sir R. Owen, and I have thought it worth while to have a drawing (fig. 1) prepared of the interior of the organ.

Fig. 1.



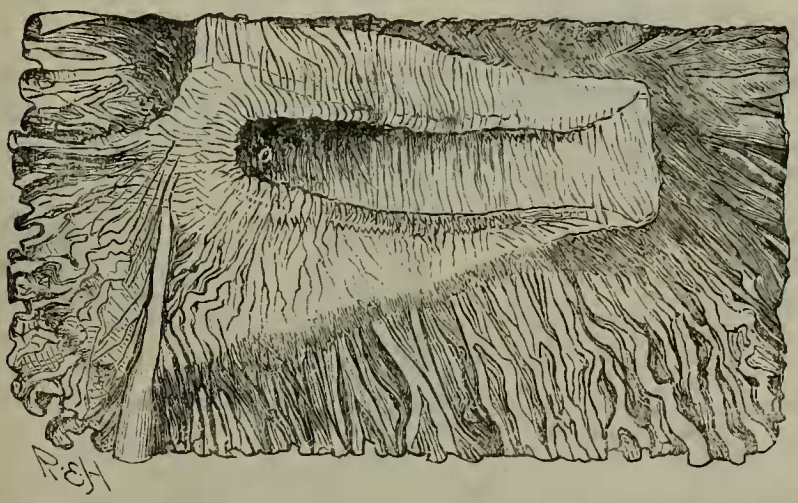
Stomach of *Dendrolagus*, with the interior displayed.
o, œsophageal orifice; *gl*, glandular patches.

The stomach is sacculated by two principal bands, which run laterally; but there are also others. At the cardiac extremity

[1] "On some Points in the Visceral Anatomy of *Ornithorhynchus*," P. Z. S. 1894, p. 715.

there is a single band on the side opposite to that at which the œsophagus enters; it dies away entirely after a course of about five inches. On the opposite side of the cardiac *cul-de-sac*, but a little way from the actual extremity, two bands form a U-shaped junction. Traced backwards, one of these two bands (that on side remote from entrance of œsophagus) has a very short course, but it nearly joins the strong lateral band of its side to which reference has already been made as extending right along the stomach as far as the pyloric end. The other loop of the U forms the strong band on the opposite side of the stomach. The interior of the stomach shows a very great contrast to that of *Petrogale penicillata*, with which I compared it. In the latter the entire cardiac end of the stomach is lined with a whitish epithelium continuous with that of the œsophagus. In *Dendrolagus* it is not; but the middle tract of the stomach leading from the œsophageal opening towards, but not as far as, the pylorus is lined with this epithelium. Round this, on both sides, there are patches of follicular glands of varying size, the largest being about half an inch long. Sir Richard Owen mentions these, and also two strong folds which start from either side of the œsophageal opening and run parallel with each other for a distance of about 3 inches towards the pylorus. The upper of these is faintly represented in *Petrogale*. There are also (in *Dendrolagus bennetti*) two folds which run downwards from the cardiac side of the œsophageal orifice and diverge from each other to form a V. They appear to form a kind of valve partly shutting off the cardiac *cul-de-sac*. They are also, though faintly, represented in *Petrogale penicillata*. The stomach of *Halmaturus* (fig. 2) is somewhat intermediate. It has the strong folds round the œsophageal orifice, but no patches of glands.

Fig. 2.



Stomach of *Halmaturus*, with the interior displayed.
o, œsophageal orifice.

The *spleen* is $6\frac{3}{4}$ inches in length; it is narrow, but dilated in a

spoon-like fashion at one end. The organ is not T-shaped, as in *D. inustus* and the Kangaroo.

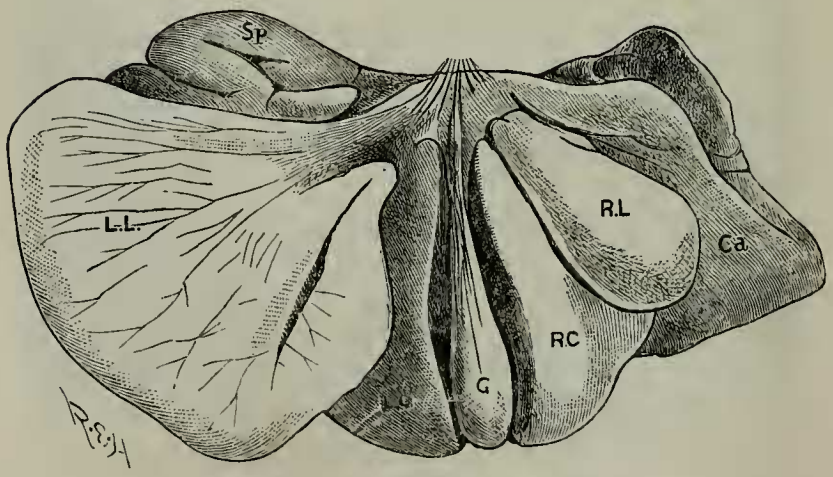
The *small intestine* measures 95 inches; I could only count 6 Peyer's patches in it. The conjoined bile and pancreatic ducts open into it at a distance of five inches from the pylorus. The *large intestine* measured 38 inches; it has, as has the cæcum, plenty of Peyer's patches. Mr. Dobson, in recording[1] the existence of Peyer's patches in certain Insectivora, Rodentia, Marsupialia, and Lemurs, omitted to mention that Owen had discovered these structures as existing in the colon of *Dendrolagus inustus*.

The *cæcum* of the present species appears to be smaller than that of *D. inustus*, in which animal the measurements given by Owen are 5 × 5 inches. I found it to be 2 inches only in length and about the same in diameter. The cæcum is attached to the small intestine by a sheet of membrane. From the opposite side of the small intestine a fold comes over, which is attached to the first-mentioned membrane. It is for the most part anangious. The blood-vessel supplying the cæcum comes across from the ileo-colic mesentery on the opposite side, where there is no connecting fold of membrane. The arrangement of the membranes supporting the cæcum is precisely the same in *Petrogale penicillata* and in *Halmaturus bennetti*; but in the former, at any rate, the accessory fold which joins the ileo-cæcal fold bears a blood-vessel along its free edge.

§ *The Liver.*

I have thought it worth while to have a drawing made of the liver of *Dendrolagus* (fig. 3), which was not particularly described by

Fig. 3.



Liver of *Dendrolagus*; abdominal surface.

Sp., Spigelian lobe; *L.L.*, left lateral; *L.C.*, left central; *R.C.*, right central; *R.L.*, right lateral; *Ca.*, caudate; *G*, gall-bladder.

[1] J. Anat. Phys. 1884.

Owen in *D. inustus*. In the species which forms the subject of the present memoir, the liver formula may be represented on Garrod's plan thus:—

L.L. 2>L.C.=R.C. 2>R.L. 3<Cau.

This formula differs markedly from that of *Petrogale penicillata*, which is as follows:—

L.L. 4>L.C.=R.C.<R.L. 3<Cau.

I am not disposed to think that very much stress can always be laid upon the relative sizes of the lobes of the liver. For example, in two species of *Halmaturus* the formulæ are as follows:—

H. bennetti. L.L.<L.C.>R.C. 2>R.L. 3<Cau.

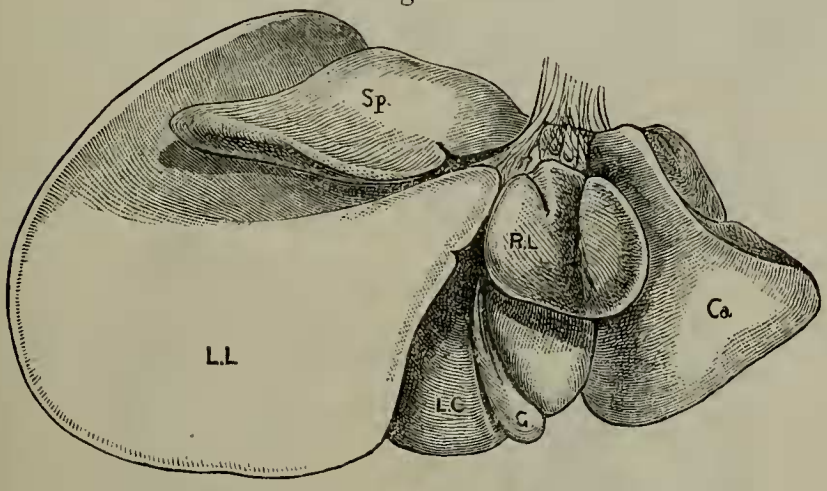
H. brachyurus. L.L. 2>L.C.=R.C.=R.L. 2<Cau. (Garrod, MS. sketch).

On the other hand, the liver of *Dendrolagus* shows two characters by which it can be distinguished from that of all the above-mentioned species and from *Petrogale* (fig. 4) and *Macropus melanops*:—

(1) The right lateral lobe is not separated by a complete fissure from the caudate.

(2) The Spigelian lobe is distinctly bilobed.

Fig. 4.



Liver of *Petrogale*; abdominal surface.
Lettering as in fig. 3.

§ *Heart and Vascular System.*

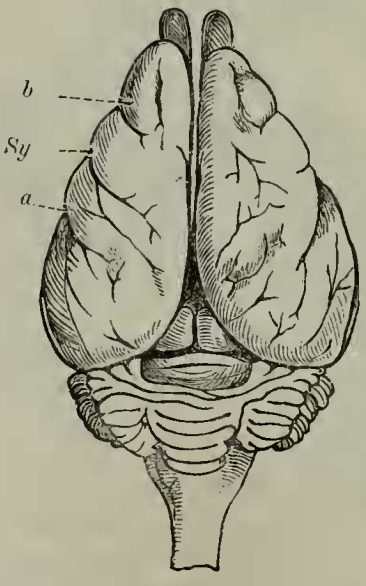
The only point that I noticed in the structure of the heart as compared with that of *Petrogale* is the presence of four separate papillary muscles attached to the free flap of the right auriculo-ventricular valve, instead of only three. The additional muscle was attached to the free wall of the ventricle.

The azygos vein shows considerable differences in different Marsupials; and I may take this opportunity of putting together the results of some recent dissections. In *Dendrolagus* there is nothing remarkable, the azygos is on the right side; but in *Halmaturus bennetti* there are two posterior cardinal veins nearly equally well developed, but longest on left side. In two specimens of this species dissected by me there were differences; in one the left azygos was much longer than in the other. *Petrogale penicillata* agreed with *Dendrolagus*; so too *Macropus rufus*. In *Phalangista vulpina* the difference was that the azygos vein was developed on the left side. In one specimen of the last-mentioned Marsupial the azygos opened directly into the vena cava posterior opposite to the entrance of the left kidney vein. The vena cava moreover was very largely absent. This state of affairs did not exist in the other individual. In *Didelphys cancrivora* and *Dasyurus maugæi* the left azygos vein was also developed and not the right. In *Didelphys azaræ* the same was the case, only the vein opened posteriorly into the vena cava opposite to renal vein; but the vena cava was not absent in front of this point.

§ *The Brain.*

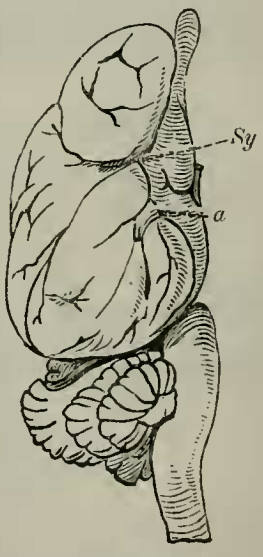
I have compared the brain of *Dendrolagus* with those of *Petrogale penicillata* and *Halmaturus bennetti*. It is about as large as that of the latter and bigger than the brain of *Petrogale*. The furrows are, however, less marked than in either of the types

Fig. 5.



Dorsal aspect.

Fig. 6.



Lateral view.

Brain of *Dendrolagus*.

Sy., Sylvian fissure; *b* anterior, *a* posterior fissure.

mentioned, even in the smaller *Petrogale*. Apart from a few furrows to which I shall call attention immediately, the surface of the brain of *Dendrolagus* is not exactly smooth. It is covered with numerous meandering lines, the imprint of blood-vessels, which I cannot compare with the furrows of the more richly convoluted brain of the Kangaroo.

The Sylvian fissure is faintly marked. In the Kangaroo and the Wallaby this fissure is encircled by an arch-like fissure as in the Carnivorous brain. In *Dendrolagus*, as may be seen by an inspection of the accompanying drawing (fig. 6, p. 136), this fissure appears to be represented by a deep groove posterior to the Sylvian fissure (*a* in the figure). The only other at all conspicuous sulcus upon the pallium of *Dendrolagus* is that indicated at *b* in the drawing (fig. 5). This fissure lies, as will be seen, in the extreme frontal region of the brain and is U-shaped. That this is an important fissure in the Marsupial brain appears to be shown by its presence also in *Macropus*, *Halmaturus*, *Petrogale*, and—a stronger argument still—in the small and nearly smooth brain of *Hypsiprymnus ogilbyi*.

February 19, 1895.

Sir W. H. Flower, K.C.B., LL.D., F.R.S., President, in the Chair.

Mr. Arthur Thomson, the Society's Head Keeper, exhibited a series of Insects reared in the Insect-house in the Society's Gardens during the past year, and read the following Report on the subject:—

Report on the Insect-house for 1894.

Examples of the following species of Insects have been exhibited in the Insect-house during the past season:—

Silk-producing Bombyces and their Allies.

Indian.

Attacus atlas.
—— *cynthia.*
—— *ricini.*
Attacus pernyi.
Antheræa mylitta.

American.

**Attacus lebeaui.*
Samia cecropia.
Actias luna.
Telea polythemus.
—— *promethea.*
Hypochera io.

* Exhibited for the first time.

African.

Bunea caffraria.
Gynanisa isis.
**Cyrtogone herilla.*
**Jana strigina?*
**Antheræa dione.*
Antheræa menippe.
Actias mimoscæ.
**Eudæmonia argus.*
Lasiocampa monteiri.

Diurnal Lepidoptera.

European.

Papilio podalirius.
—— *machaon.*
Thais cerisyi.
Melitæa cinxia.
Vanessa polychlorus.
—— *antiopa.*
Limenitis populi.
Apatura iris.

American.

Papilio ajax.
—— *cresphontes.*
—— *asterias.*
*—— *ilioneus.*
Papilio turnus.
Limenitis disippus.
Goniloba tityrus.

African.

Papilio porthaon.
**Papilio corinneus.*

Nocturnal Lepidoptera.

Smerinthus populi.
—— *tiliæ.*
Sphinx ligustri.
—— *pinastri.*
—— *carolina.*
Deilephila vespertilio.
—— *euphorbiæ.*
*—— *lineata.*
Chærocampa elpenor.
Darapsa myron.
**Philampelus achemon.*
**Ceratomia amyntor.*
Saturnia pyri.
—— *carpini.*
Eacles imperialis.
**Eupalia trimaculata.*
**Eulimacodes scapha.*
**Parasa chloris.*
**Euglyphia hieroglyphica.*

* Exhibited for the first time.

Of the lepidopterous insects which I have the honour to place before the Meeting this evening the following are exhibited for the first time:—*Papilio ilioneus*, from North America; *Papilio corinneus*, from South Africa; *Antheræa dione*, *Cyrtogone herilla*, *Jana strigina?*, and *Eudæmonia argus*, from Sierra Leone; *Attacus lebeaui*, from Honduras; *Deilephila lineata*, *Philampelus achemon*, *Ceratomia amyntor*, *Eupalia trimaculata*, *Eulimacodes scapha*, *Parasa chloris*, from North America, and *Euglyphia hieroglyphica*, from Jamaica.

The most interesting of these insects are the specimens of *Eudæmonia argus*, which have been reared from some living pupæ brought from Sierra Leone, and presented to the Society by the Hon. C. B. Mitford. These moths generally emerge in the early morning, and are fully developed in about two hours. If they are disturbed, they immediately drop down and feign death, and it

will be easily understood that, with such long delicate tails, great care is required in killing and setting them.

The specimens of *Antheræa dione*, *Cyrtogone herilla*, and *Jana strigina* emerged from a collection of pupæ (also from Sierra Leone) deposited in the Insect-house by the Hon. Walter Rothschild.

The specimens of *Attacus lebeaui* were all reared from cocoons received in October to November 1894. The gentleman from whom I obtained them had a pairing of these insects and succeeded in rearing some of the larvæ. Of these he sent me four, in their fifth stage, and he informs me that the larvæ in the first three stages are black with yellow tubercles, in the fourth stage they are green, with the same stripes in the folds of the segments as in the fifth stage, but not quite so well marked, and have besides rows of dorsal and lateral tubercles of a reddish colour. They ate oak, berberis, and privet; but after the first stage fed entirely upon privet. Of these larvæ, I herewith exhibit a sketch, made just before they spun their cocoons. These cocoons, I may add, are much larger than those imported.

On the 30th of May, 1894, two Goliath Beetles (*Goliathus druryi*) were presented to the Society by Capt. G. L. Mitchell. They fed principally upon bananas. During life they were a great attraction to visitors. One died on the 24th July and the other on the 21st August, and both specimens were sent to the British Museum.

Of Orthoptera, a very curious and rare locust, *Thliboscelus camellifolia*, was sent home by Mr. Leslie Jeyes, from Manáos on the Amazons, where it is called the "Tanana." It arrived in the Gardens on the 21st of August, but, I am sorry to say, lived only six days. It was very weak on arrival and would not feed, although we got roses (its favourite food) for it. Of this species there is only one specimen in the British Museum. In a wild state Mr. Jeyes says "it sings or chirps through its wings." During life it was of a beautiful pale green colour, and this together with its peculiar shape gave it the appearance of some kind of green fruit. The sender says they are very difficult to obtain dead or alive; it is therefore probable that they are, on account of their shape and colour, not easy to see.

1. On the Brain of *Gulo*. By Frank E. Beddard, M.A., F.R.S., Prosector to the Society.

[Received January 21, 1895.]

One of the few important types of Carnivora the brain of which was not examined by Prof. Mivart[1] is the Glutton. As I have a well-preserved brain of this animal, it may be considered worth while to attempt to fill up this lacuna in our knowledge. We are not,

[1] "On the Cerebral Convolutions of the Carnivora," Journ. Linn. Soc. xix. p. 1.